

National Nutrient Perspective

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Region 8 Nutrient Coordinator



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Overview

- Nutrient Effects on the Environment
- Scope of National N and P Pollution Issue
- EPA's Nutrient Activities
- Montana's Nutrient Approach Compared to other States



Why Care About Nutrients?

- Elevated nutrients in streams and lakes can result in:
 - Excess algal growth
 - Low dissolved oxygen
 - Shifts in the algal, bug or fish composition
 - Taste and odors in drinking water
 - Toxic algal blooms that can impact human health





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Photo credit: Oregon DEQ



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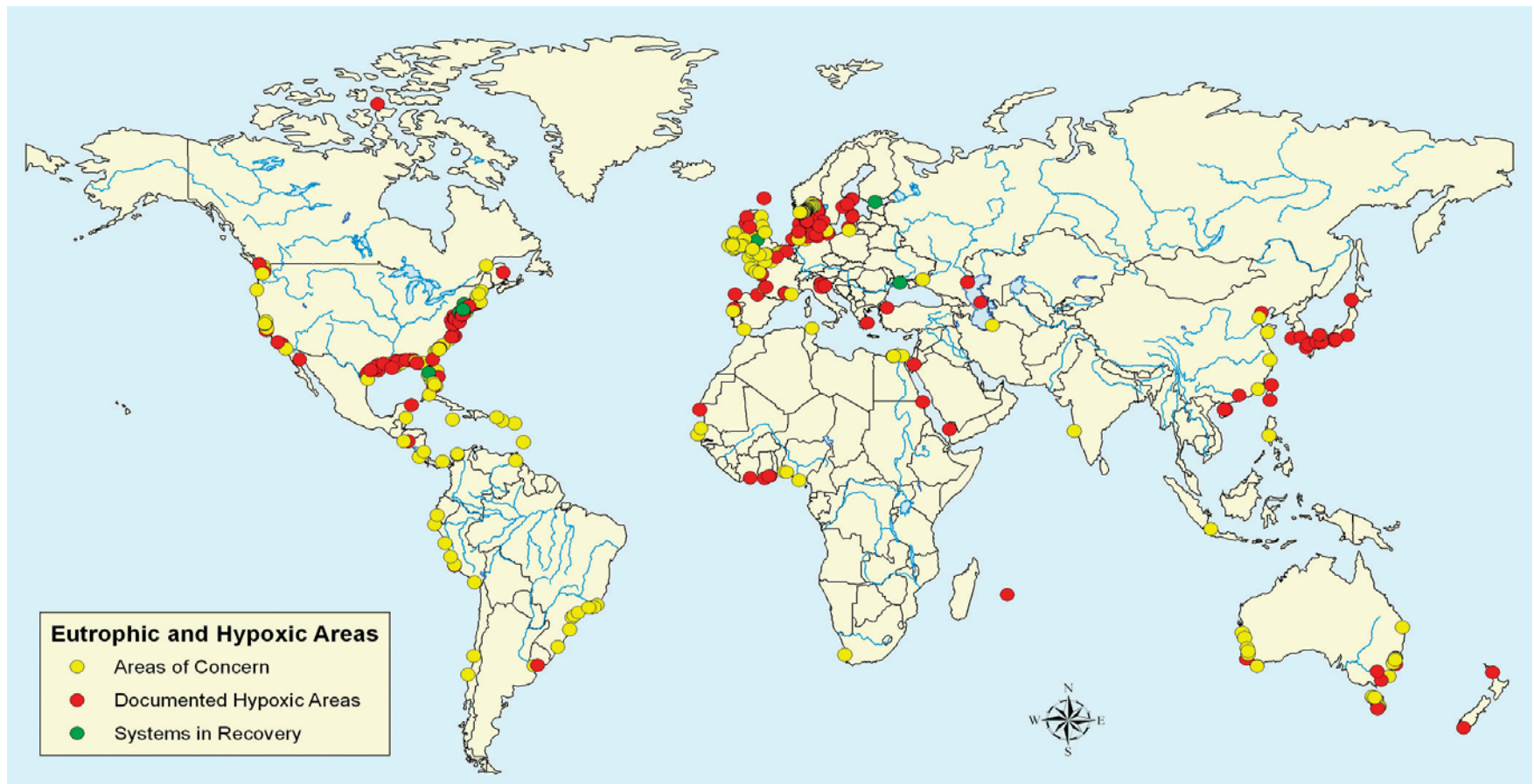
Photo credits:
M. Suplee, V. Watson, M. Toply, and H.
McKee

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Nutrients Problems are Well-Documented Problem

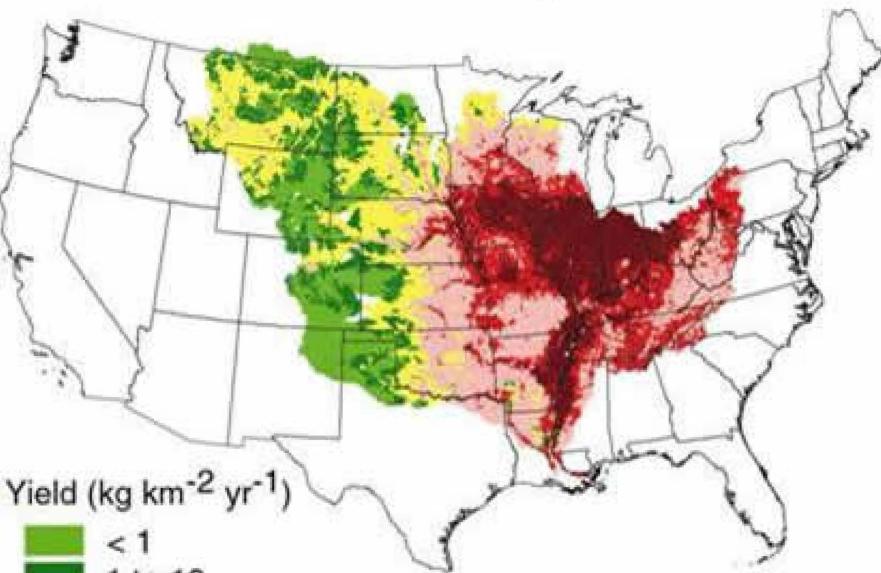
- **EPA:**
 - Science Advisory Board (2007)
 - Wadeable Streams and Lakes Assessments (2006, 2008)
 - National Coastal Condition Report III (2008)
- **National Research Council:**
 - Mississippi River Water Quality (2008)
 - Urban SW (2008)
- **USGS**
 - Impact of Nutrients on Groundwater (2010)
 - SPARROW Loadings (multiple)
- Many published articles, State and university reports
- State EPA Nutrient Innovations Task Group (NITG) *Call to Action* Report

Hypoxic areas in the U.S. have increased dramatically over the last 50 Years

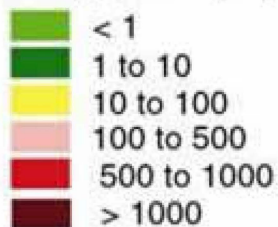


Nutrient Loading to the Gulf of Mexico

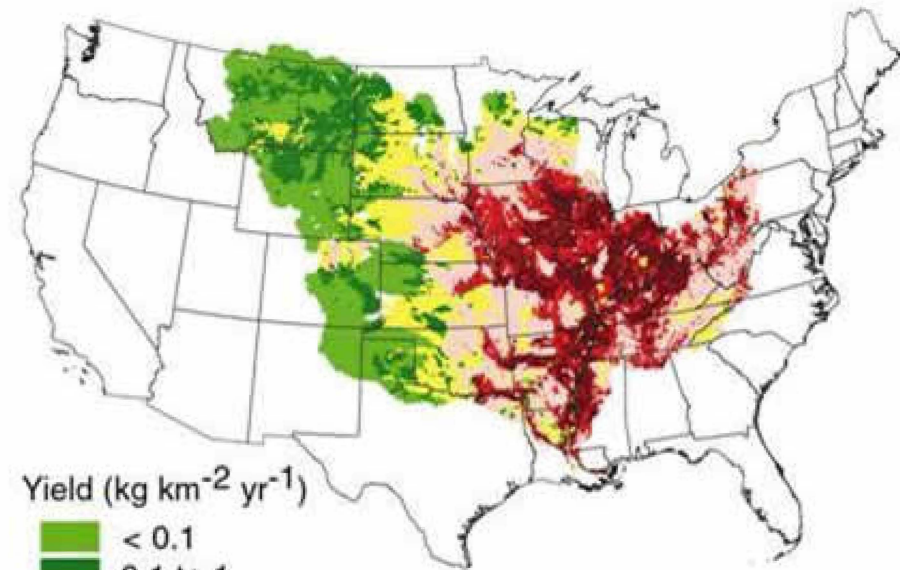
Total Nitrogen



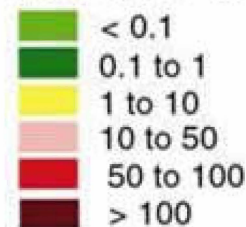
Yield (kg km⁻² yr⁻¹)



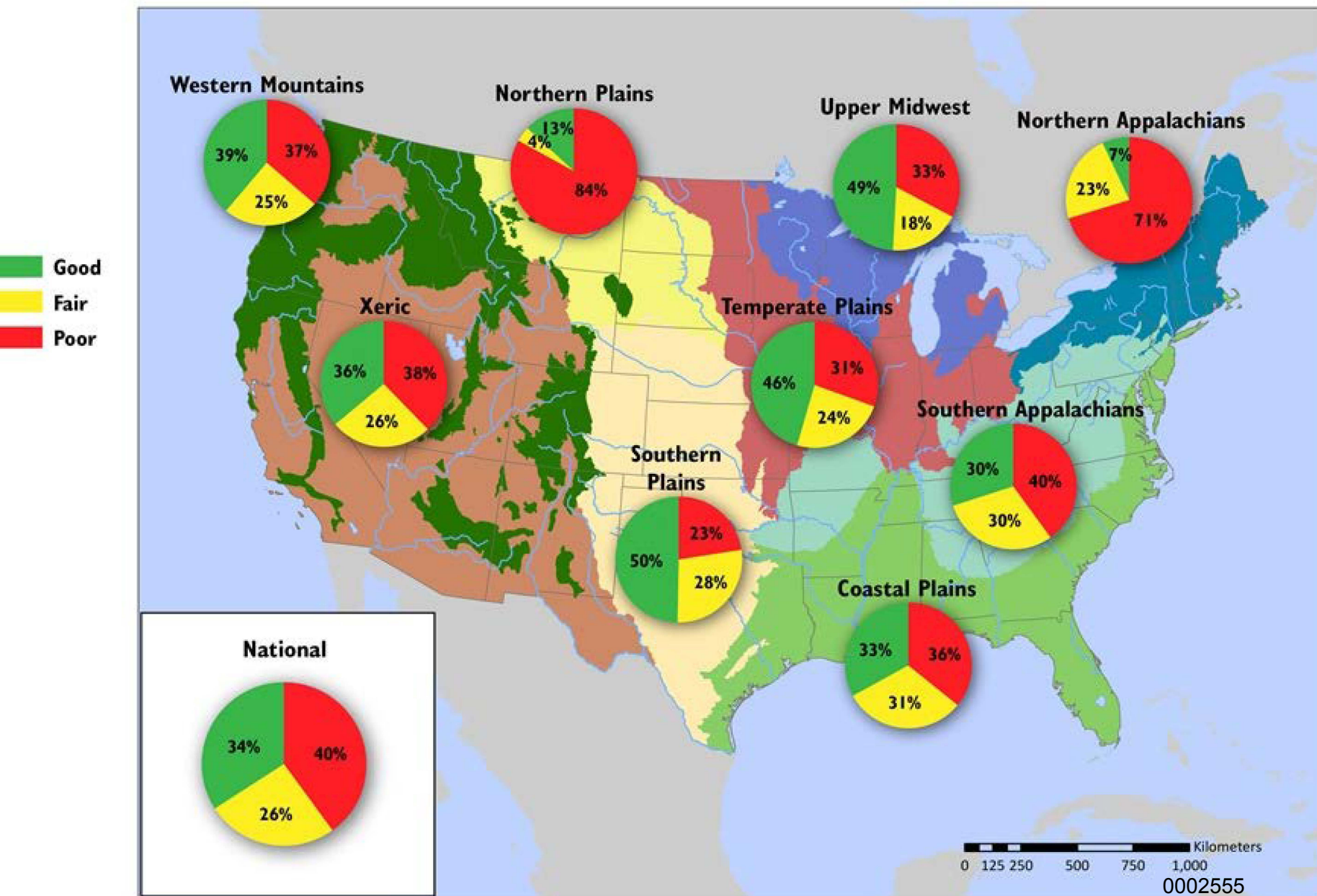
Total Phosphorus



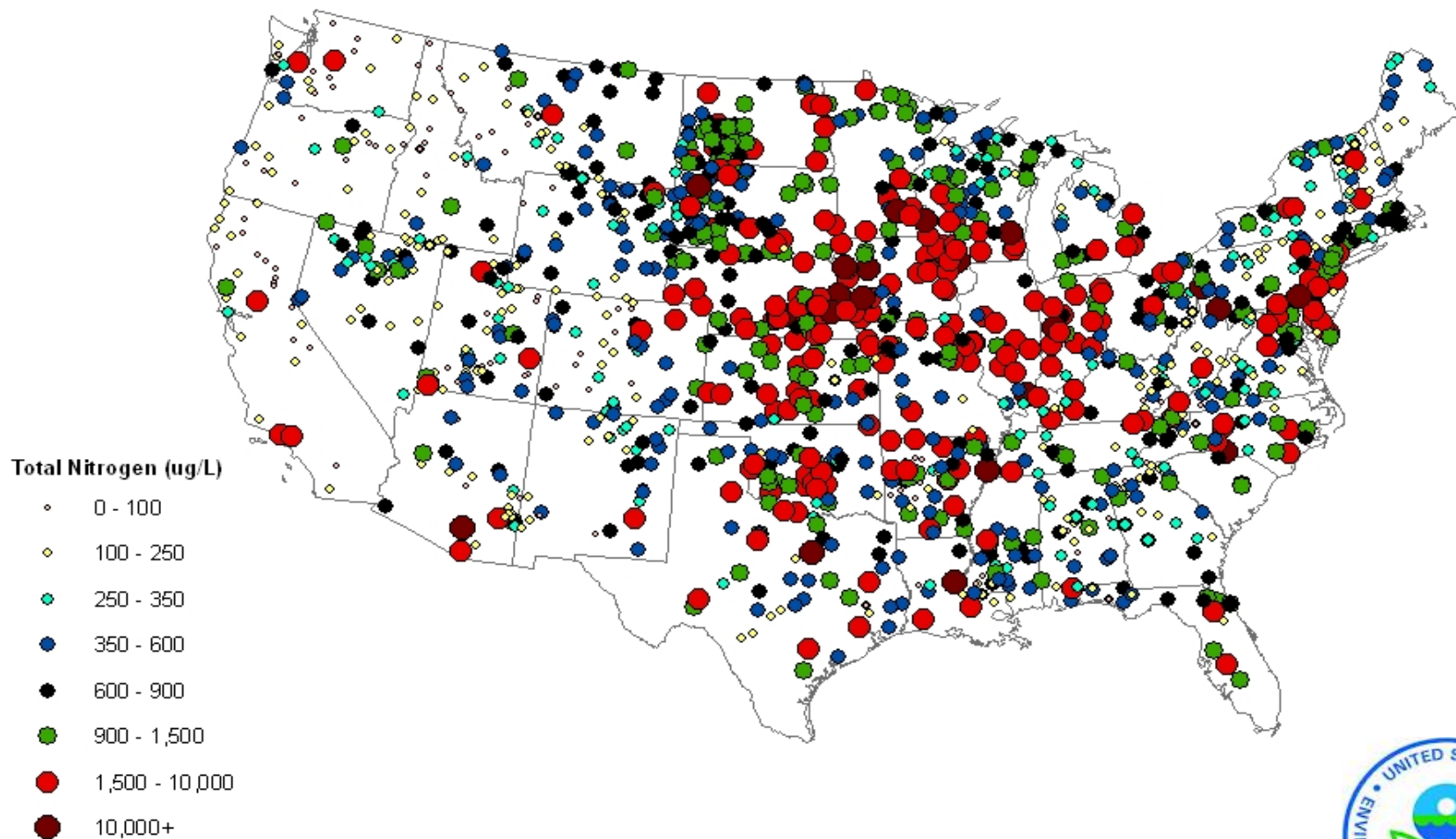
Yield (kg km⁻² yr⁻¹)



Total Phosphorus

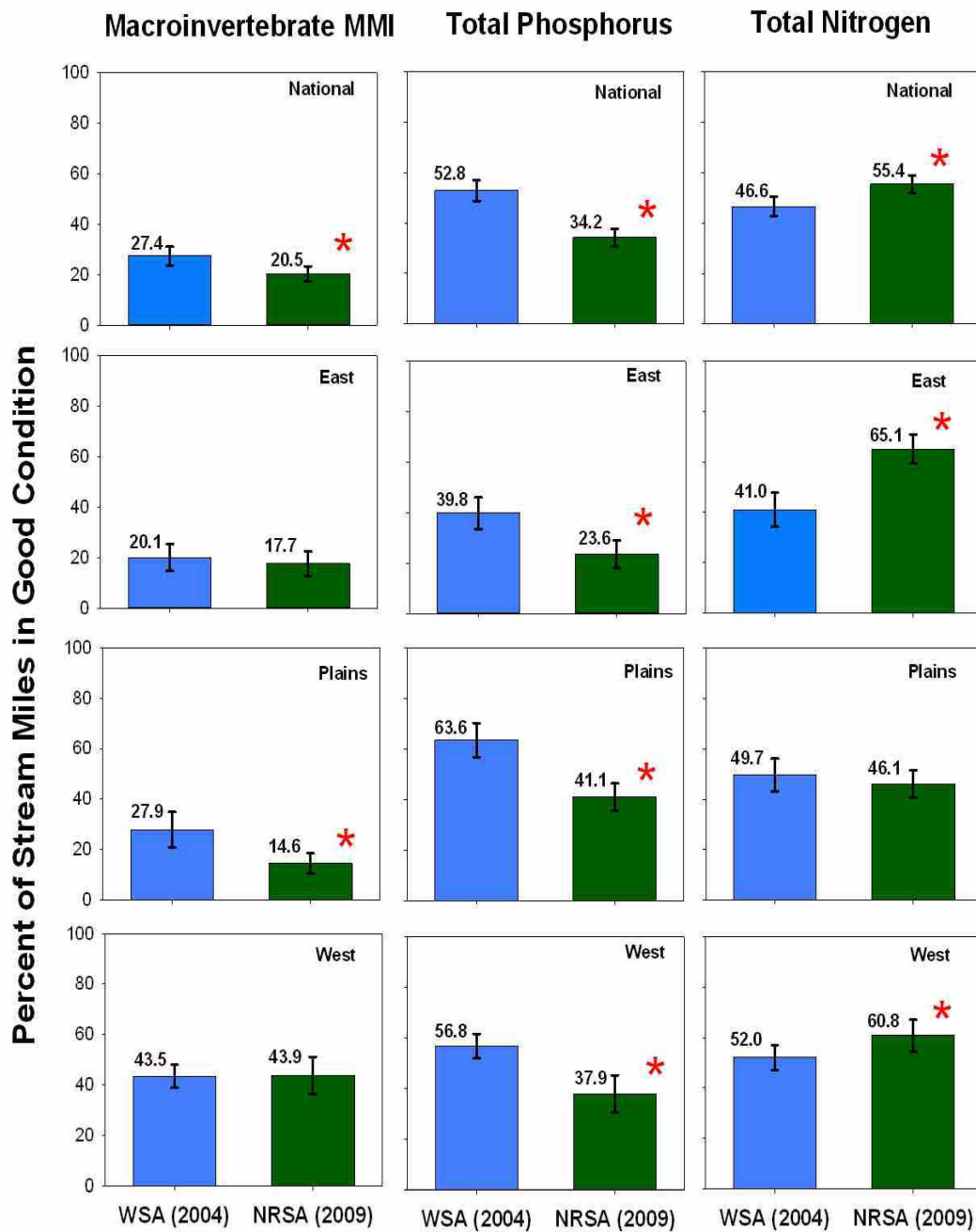


NRSA Survey Results: Total Nitrogen Concentrations

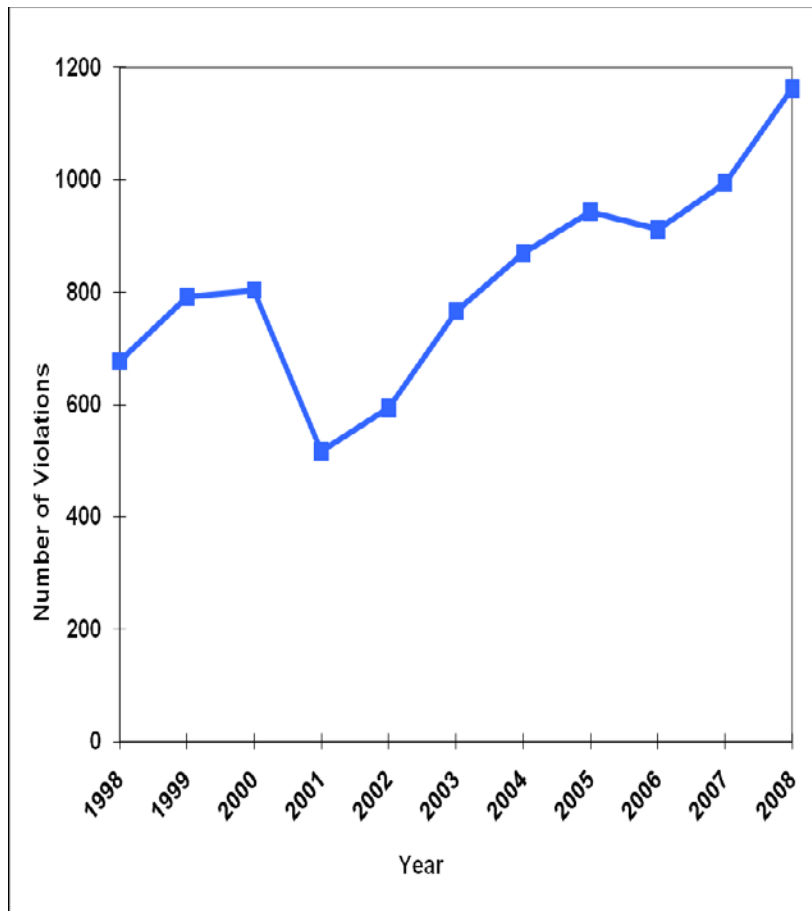


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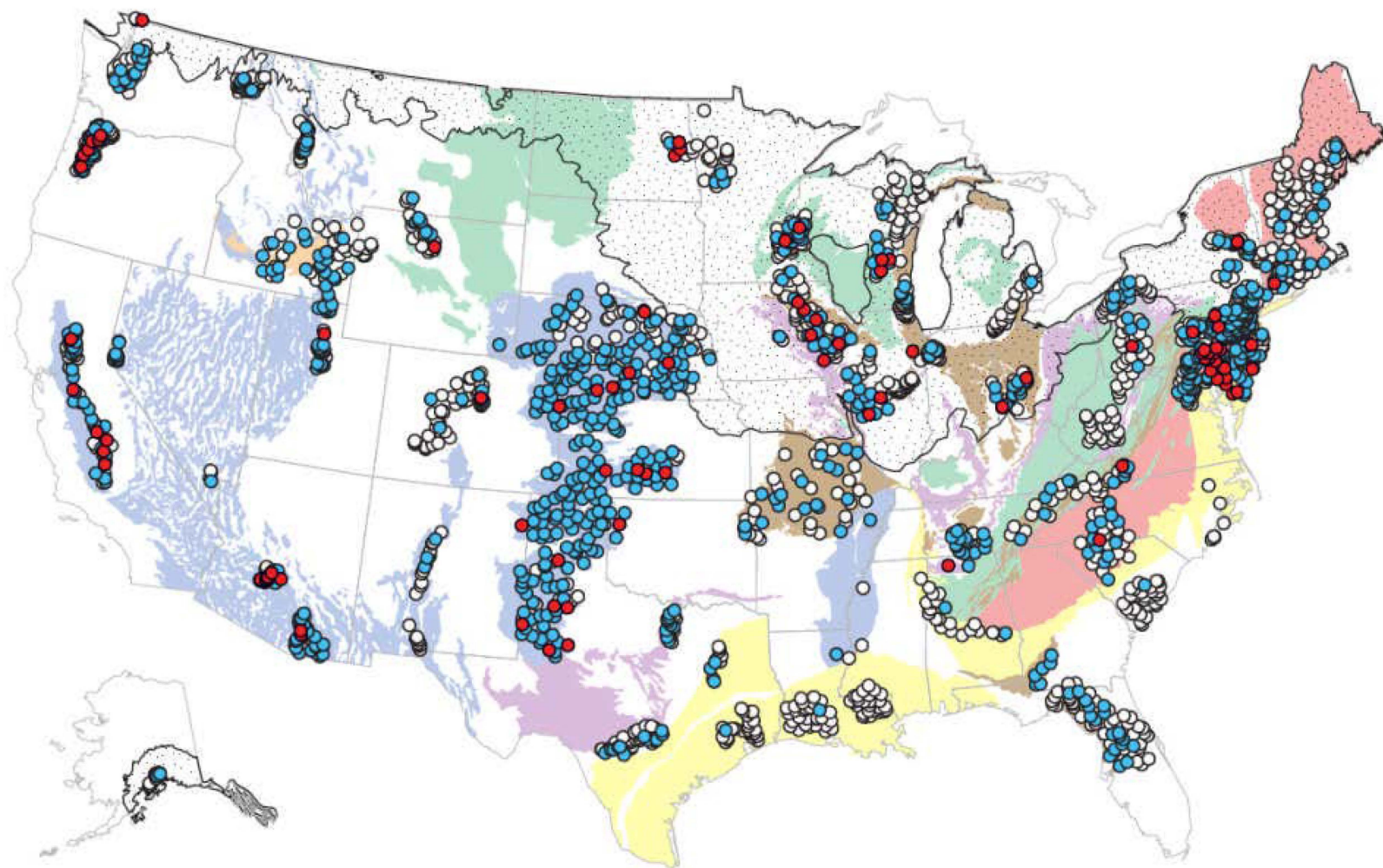




Nitrate in Ground Water - HQs slide?



- 495 private wells in agricultural areas
- Sampled in 1988 -1995 and 2000-2004
- Nitrate concentrations have increased in response to N fertilizer use since 1950



EXPLANATION

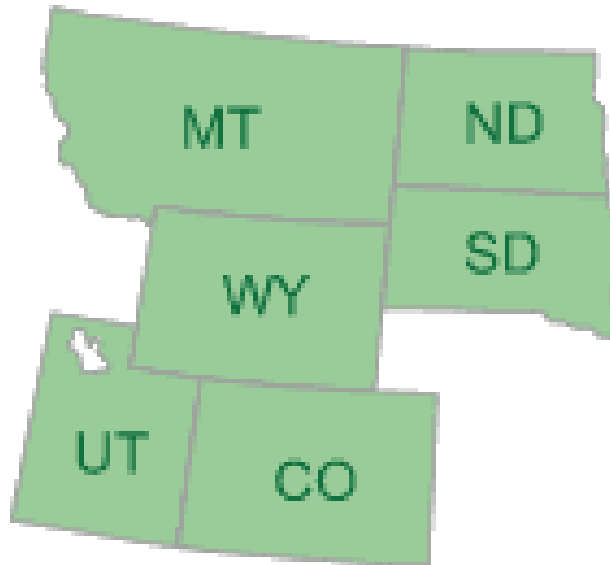
Nitrate, in milligrams per liter as N

● > 10 ● > 1 and ≤ 10 ○ ≤ 1

State Integrated Reports

- 14,000 Nutrient-related Impairment Listings in 49 States...an underestimate
 - ~4 Million Acres of Lakes and Reservoirs
 - 155 ,000 Miles of Rivers and Streams
- One third of U.S. estuaries are eutrophic





EPA Region 8

Waters Threatened/Impaired by Nutrient Pollution:

>8,000 river miles

>300,000 lake acres





Sources

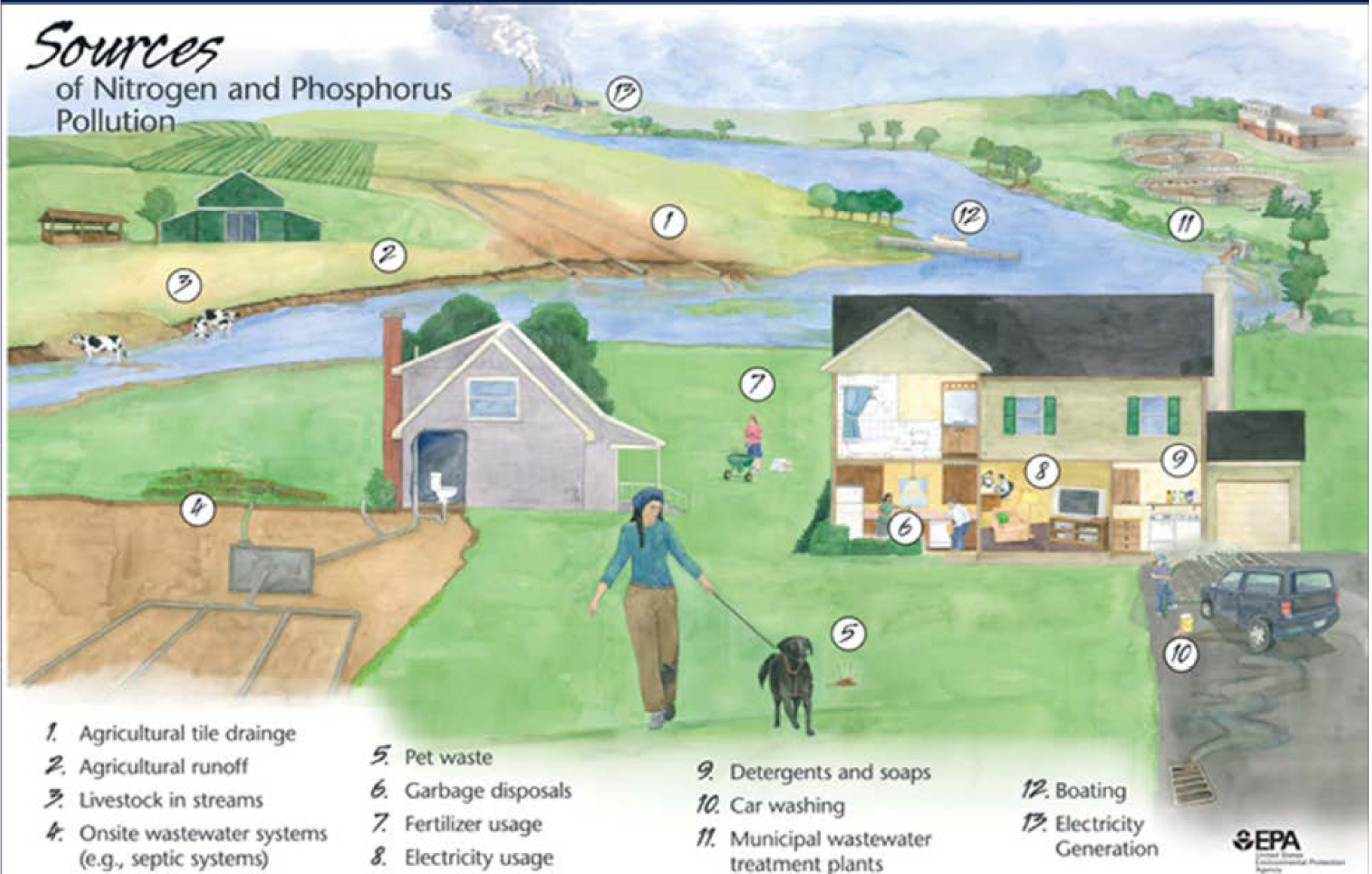


- **Municipal Wastewater Treatment**
 - Among most heavily regulated sectors in US
 - >16,500 municipal treatment system permits
- **Atmospheric Nitrogen Deposition**
- **Urban Stormwater**
 - 80% of U.S. pop lives on 10% of land
 - 50% of existing urban landscape will be redeveloped by 2030
- **Agricultural Livestock**
 - \$130 Billion Industry , >1 bil tons of manure annually
- **Agricultural Row Crops**
 - Significant source of N&P in many areas
 - Generally exempt from CWA regulation

Everyone Has a Role

Sources

of Nitrogen and Phosphorus
Pollution



EPA's Nutrient Framework: Why Now?

- Serious problem that is getting worse
 - Potential to become one of the costliest and most challenging environmental problems
- Growing population
- To protect public health and the environment, need to act *now* to reduce N and P loadings -- while states continue to develop numeric nutrient criteria and standards





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 16 2011

OFFICE OF
WATER

MEMORANDUM

SUBJECT: Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions

FROM: Nancy K. Stoner
Acting Assistant Administrator

TO: Regional Administrators, Regions 1-10

This memorandum reaffirms EPA's commitment to partnering with states and collaborating with stakeholders to make greater progress in accelerating the reduction of nitrogen and phosphorus loadings to our nation's waters. The memorandum synthesizes key principles that are guiding and have guided Agency technical assistance and collaboration with states and urges the Regions to place new emphasis on working with states to achieve near-term reduction of nutrient loadings.

Over the last 50 years, as you know, the amount of nitrogen and phosphorus pollution entering our waters has escalated dramatically. The degradation of drinking and environmental water quality associated with excess levels of nitrogen and phosphorus in our nation's water has been studied and documented extensively, including in a recent joint report by a Task Group of senior state and EPA water quality and drinking water officials and managers.¹ As the Task Group report outlines, with U.S. population growth, nitrogen and phosphorus pollution from urban stormwater runoff, municipal wastewater discharges, air deposition, and agricultural livestock activities and row crop runoff is expected to grow as well. Nitrogen and phosphorus pollution has the potential to become one of the costliest and the most challenging environmental problems we face. A few examples of this trend include the following:

- 1) 50 percent of U.S. streams have medium to high levels of nitrogen and phosphorus.
- 2) 78 percent of assessed coastal waters exhibit eutrophication.
- 3) Nitrate drinking water violations have doubled in eight years.

¹ *An Urgent Call to Action: Report of the State-EPA Nutrients Innovations Task Group*, August 2009.



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Framework: Guiding Principles

- **Results, results, results:** build from existing state work but accelerate progress and demonstrate clear results
- Encourage a collaborative approach between federal partners, states, and stakeholders
- States need flexibility to achieve near-term reductions in N and P pollution while they make progress on their long term strategies

EPA's recommended elements of a strategy

- 1 • Prioritize watersheds for N & P load reductions (HUC 8 – 12)
- 2 • Set watershed load reduction goals on available info
- 3 • Ensure effective permits (WPDES, CAFO, storm water)
- 4 • Agricultural areas
- 5 • Storm water & Septics (MS4s, leverage local gov't resources)
- 6 • Accountability and Verification
- 7 • Annual public reporting of implementation and reductions
- 8 • Develop workplan for numeric P and N criteria

Other EPA Nutrient Efforts

- Training to assist permit writers in developing WQBELs for nutrients
- Development of “guiding principles” for consideration when using response variables with numeric nutrient criteria
- National coordination with NRCS on the National Water Quality Initiative



EPA N and P Pollution Data Access Tool (NPDAT)

- Consists of a geospatial viewer, introductory website, and data download tables, available at:
www.epa.gov/nutrientpollution/npdat
- Generally contains “Pre-assembled” data that is publicly available elsewhere
 - Provides streamlined access to these data in one place, in commonly-used formats
- Supports states as they consider
 - Extent and magnitude of N and P pollution
 - Water quality problems and vulnerabilities related to this pollution
 - Potential pollution sources

Nutrient Pollution

Additional Resources Available



United States Environmental Protection Agency

Mobile | Español | 中文: 繁體版 | 中文: 簡體版 | Tiếng Việt | 한국어

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Nutrient Pollution

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Nutrient Pollution
> One of America's most widespread, costly, and challenging environmental problems is excess nitrogen and phosphorus in the air and water.

1 2

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TECHNICAL RESOURCES



Visit EPA's site for [nutrient pollution policy and data](#).

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<http://epa.gov/nutrientpollution/>

Progress Toward Clean Water Act Adopted Numeric Nutrient Criteria



Montana Nutrient Summary

- MDEQ's proposed criteria are scientifically defensible and protective of the designated uses
- Variances to the WQS are a key aspect of MT program for nutrients
- MDEQ's trading policy offers additional flexibility

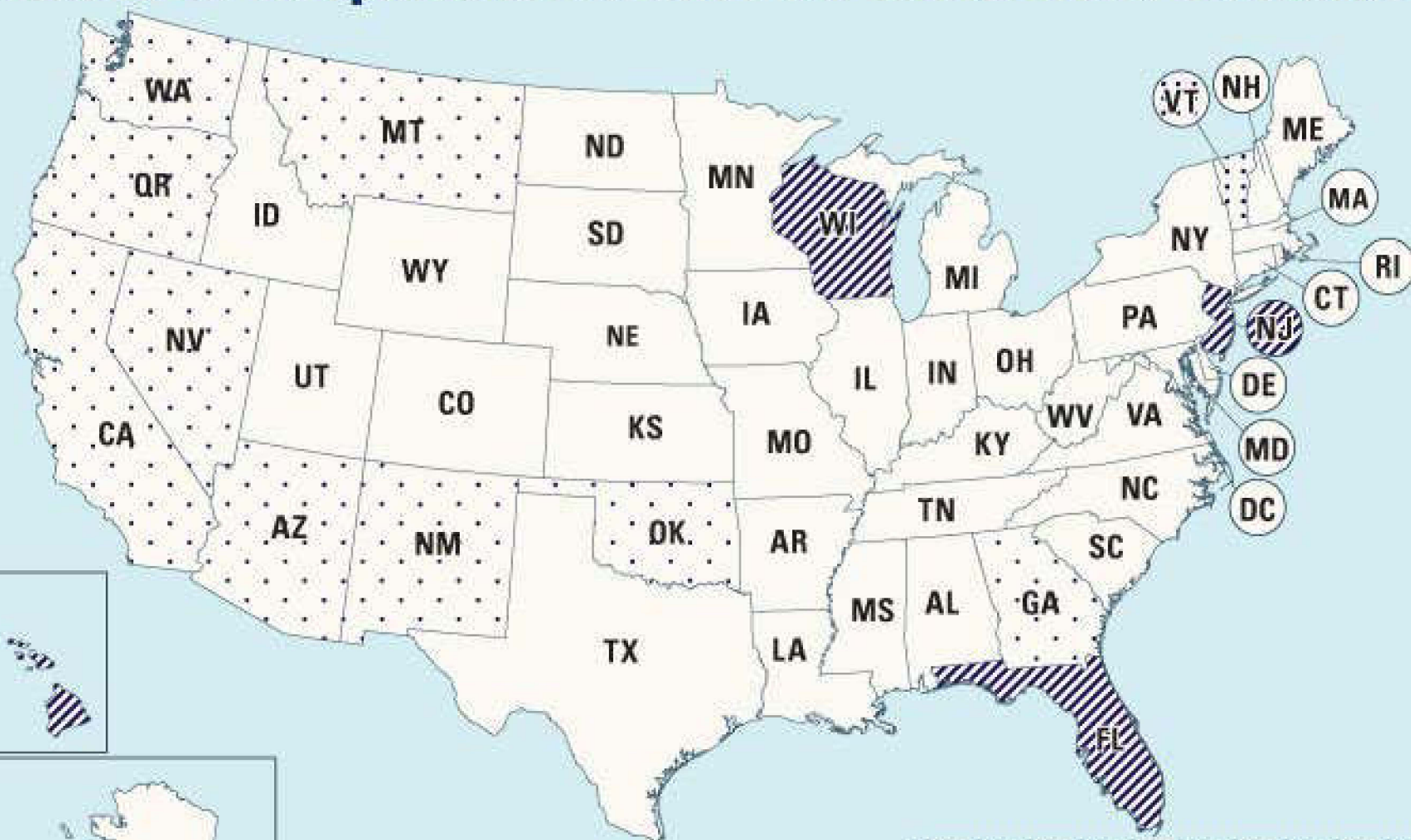






How does MT's Approach Compare to Other States?

- Montana's nutrient criteria efforts focus on wadeable streams and large rivers vs. lakes
- MT's nutrient rules include nitrogen criteria
 - TP focus by most states
 - Examples of states with TN criteria include:
 - * FL
 - * CO
 - * VT
 - * NY
 - * UT – criteria currently under development

Numeric Phosphorus Criteria for Rivers and Streams



 Statewide Criteria
 Site-specific Criteria

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American Samoa	Puerto Rico
Guam	U.S. Virgin Islands
Commonwealth of Northern Mariana	

Numeric Nitrogen Criteria for Rivers and Streams



Preventing Eutrophication: Scientific Support for Dual Nutrient Criteria

Summary

Nutrient pollution resulting from excess nitrogen (N) and phosphorus (P) is a leading cause of degradation of U.S. water quality. The scientific literature provides many examples that illustrate the effects of both N and P on instream and downstream water quality in streams, lakes, estuaries, and coastal systems. Development of numeric nutrient criteria for both N and P can be an effective tool to prevent eutrophication and protect designated uses in the nation's waters. The purpose of this fact sheet is to describe the scientific basis supporting the development of criteria for both N and P. It does not address the flexibility that states and authorized tribes have to prioritize the development of criteria based on nutrient management strategies.

Background

Nitrogen and phosphorus together support the growth of algae and aquatic plants, which provide food and habitat for fish, shellfish and other organisms that live in water. Excess N and P in aquatic systems can stimulate production of plant (including algae and vascular plants) and microbial biomass, which leads to depletion of dissolved oxygen, reduced transparency, and changes in biotic community composition -- this is called eutrophication [30]. In addition to the impacts on aquatic life, excess nutrients can also degrade aesthetics of recreational waters [29, 33, 34], and increase the incidence of harmful algal blooms, which may endanger human health [2].

Under the Clean Water Act, states and authorized tribes are responsible for establishing water quality standards that specify appropriate designated uses, establish criteria to protect those uses, develop anti-degradation policies and implementation methods, and provide for the protection of downstream waters. Numeric nutrient criteria are an important element of water quality standards and are an effective tool

for preventing nutrient pollution, for example, in helping to derive numeric limits in discharge permits. Development of numeric nutrient criteria is one aspect of a coordinated and comprehensive approach to nutrient management [42]. EPA has published several guidance documents to assist states and authorized tribes in deriving numeric nutrient criteria for both N and P to protect aquatic systems [36, 37, 38, 40, 41].

In waters where a nutrient-related impairment has already been identified, focus on a single nutrient may be warranted to restore designated uses. This may be the case in waters with strong single nutrient limitation or those without significant connection to downstream waters that have a different limiting nutrient. In these instances, evaluation of data on nutrient limitation status is needed to determine how N and P concentrations affect the aquatic systems.

Why develop criteria for both N and P?

Nutrient management efforts have traditionally focused on controlling a single limiting nutrient (i.e., N or P) based on a paradigm that assumes primary production is N-limited in marine waters and P-limited in freshwaters. Conceptually, the assumption is that if the key limiting nutrient is controlled, primary production is limited and the cascading effects of eutrophication do not occur. In practice, however, there are scientific reasons that make this an overly simplistic model for management of nutrient pollution as described below.

Trophic status may vary both spatially and temporally.

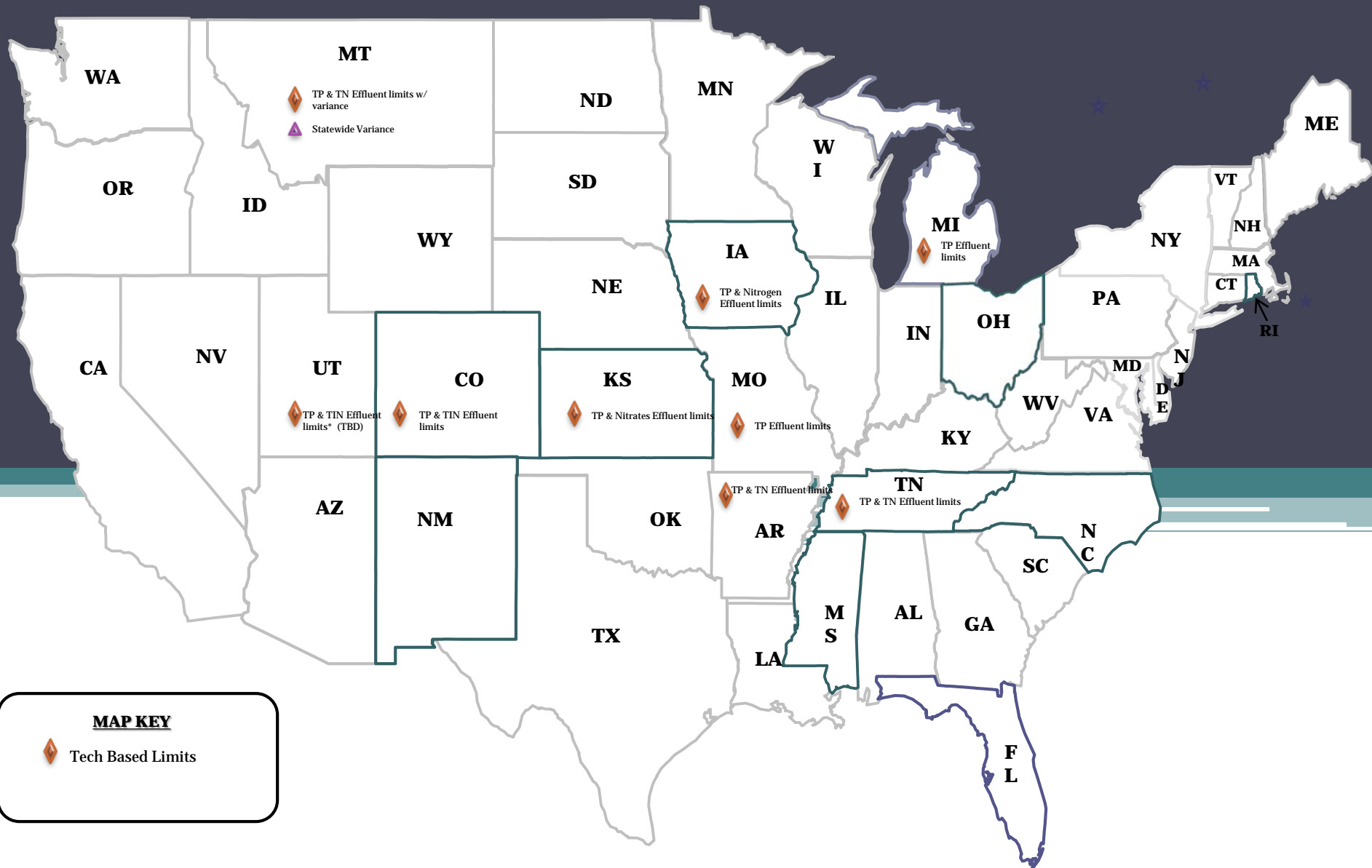
The scientific literature demonstrates that nutrient concentrations vary across a landscape as a result of a multitude of factors, including climate, flow, geology, soils, biological processes, and human activities. This variability

How does MT's Approach Compare to Other States?

- Identifying flexible approaches to implementing nutrient criteria is central to MDEQ's approach
- Use of variances for categories of dischargers
 - Based on a demonstration of “substantial and widespread” economic impacts
 - 3 discharger categories: > 1 MGD; < 1MGD; and lagoons



Nutrient Activities Map



Summary

- Addressing nutrient pollution is a priority for EPA both nationally and regionally.
- EPA is committed to working with MDEQ to finalize adoption of their numeric nutrient criteria.
- For additional information:
 - <http://epa.gov/nutrientpollution>
 - <http://epa.gov/nandppolicy>



Photo Credit: Peter Ismert

Questions?

Preventing Polluted Runoff *Everybody's Business*



pet waste, fertilizer,
chemicals, auto fluids

Homeowners can prevent polluted runoff by using fertilizers and chemicals sparingly, maintaining septic systems, and picking up pet waste.



nutrients, pesticides,
sediment

Farmers can prevent polluted runoff by managing soil and animal feeding operations and buffering streams with native trees and plants.



oil, heat, road salts,
sediment, chemicals

Developers and planners can prevent polluted runoff by using low impact development and providing structural and nonstructural controls.



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